

ANTA National Student Bursary

Application

Of:

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Bachelour of Health Science - Musculoskeletal Therapy

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Research Project - Pregnancy and Structural Scoliosis

Scoliosis

Scoliosis is a lateral deviation in the normally straight vertical line of the spine; it may or may not include rotation or deformity of the vertebrae. Causes of scoliosis are varied and include congenital, secondary to traumatic injury, spinal tuberculosis, and infantile poliomyelitis, but are most frequently idiopathic (Miller, Keane, 1992). Kyphoscoliosis acquired at birth and scleral fragility are symptoms of the autosomal dominant and recessive genetic disorder, Ehlers-Danols syndrome (EDS) (Heinz, 2008).

Scoliosis occurs in both sexes; however girls are more likely to have more severe curvatures. It can occur at any time or age, and is most often noticed in adolescents due to the accelerated growth rate and the deformity progresses to a severe curvature in a short period of time (Miller, Keane, 1992).

Affects Pregnancy has on the Body

Postural changes that occur during pregnancy help the woman maintain balance in the upright position as the fetus grows. The increasing weight is distributed primarily in the abdominal girth. After 12 weeks of pregnancy the uterus expands out of the pelvis and moves superiorly, anteriorly, and laterally. The abdominal muscles become less effective at maintaining neutral posture (shoulders back, avoiding hyperlordosis) because the growing uterus stretches the muscles and reducing tone. Initially, however, studies have shown that lumbar lordosis remains the same or increases only slightly. The center of gravity as a whole, though, shifts more posteriorly and inferiorly as the spine moves posterior to the center of gravity. Lumbar pain during pregnancy can stem from multiple sites, most commonly the facet joints, paraspinal muscles, supporting ligaments, or discogenic sources (Colliton, 2007).

Relaxin

Relaxin is a hormone produced during pregnancy which is thought to activate the collagenolytic system; which alters the ground substance by increasing its water content, decreasing viscosity and regulates new collagen formation. Its action is to decrease the intrinsic strength and rigidity of the collagen and is thought to be responsible for the softening of the ligaments supporting the sacroiliac joints, symphysis pubis, the pelvis and lower spine; allowing for ease of the delivery of the baby. (Chaitow, DeLany, 2002).

As pregnancy progresses, relaxin is released and increases tenfold, allowing pelvic expansion to accommodate the enlarging uterus, reaching its peak at the 14th week. In the lumbar spine, joint laxity is most notable in the anterior and posterior longitudinal ligaments, both of which are pain-sensitive structures. With increasing laxity, the ligaments can't as effectively withstand shear forces, which may cause discogenic symptoms and/or pain from the facet joints may increase. (Colliton, 2007)

Concerns that these hormonal fluctuations and relaxin released will lead to a progression of spinal curvature are largely unfounded and has been disproved; provided the mother's curvature is stable at the beginning of the pregnancy (Simonds, A, K, 1998).

Muscular Changes/Imbalances

As the abdominal muscles stretch to accommodate the growing fetus, their ability to help stabilize the pelvis decreases. The burden shifts to the paraspinal muscles, which become strained, with scoliosis present, the weight shift will put an increased strain on the already shortened imbalanced musculature (Colliton, 2007).

Pain at night may be a presenting symptom; as muscle fatigue may accumulate throughout the day and culminate in back pain at night, daylong biomechanical stress from sacroiliac dysfunction or mechanical low-back pain from altered posture can also

produces symptoms in the evening. Circulatory changes during pregnancy may also contribute to low-back pain at night (Colliton, 2007).

Symphysis Pubis and Sacroiliac Pain

In the pelvis, joint laxity is most prominent in the symphysis pubis and the sacroiliac joints. If the scoliosis spans from the lumbar to sacrum, movement of these joints may impact on the position and stabilization of the spine.

The symphysis pubis widens throughout pregnancy from its normal width of .5 mm to a maximum of approximately 12 mm. With widening comes the possibility of vertical displacement of the pubis and rotatory stress on the sacroiliac joints, if a rotation in the spine is present due to scoliosis, the risk of further rotation is present. During pregnancy, movement in the sacroiliac joints can increase dramatically, causing discomfort when the pain-sensitive ligamentous structures are stretched. Sacroiliac pain is felt distal and lateral to the lumbar spine near the posterior superior iliac spine, and may radiate to the posterolateral thigh, usually to the level of the knee and rarely to the calf. It is four times more common than lumbar pain (Colliton, 2007).

How Scoliosis affects Pregnancy (Myths/ Beliefs - Scientific Evidence)

Client's Experience

My client has structural scoliosis, which formed during adolescent years. The client stated that she did not experience any problems or difficulties with the pregnancy or labor, and didn't consider her back pain to be any worse during pregnancy due to the scoliosis.

However, my client mentioned that her twin sister had experienced difficulties in labor, due to her scoliosis ranging from lower thoracic to lumbar spine, which meant she couldn't have an epidural, which led to her having a cesarean section and the use of

other anesthetics. This provoked extra stress and anxiety to the mother throughout the labor.

Impact on Pregnancy and Fertility

The degree of difficulty during pregnancy is found to be relative to the severity of the condition. If the spinal curvature is severe, involving the hip or shoulders, configuration of the thoracic area or the pelvis; it may cause more severe discomfort, breathing problems or weight bearing difficulties during later pregnancy (Scoliosis SOS Clinic, 2008).

Scoliosis can increase pregnancy risk as the uterus expands, further impeding the natural upward displacement of the diaphragm and reducing vital capacity and residual volumes. Women with scoliosis may have difficulty compensating for this displacement related to skeletal narrowing of the thoracic cavity. Losses of the normal adaptive mechanism lead to V/Q mismatches and increased work of breathing. Patient education should target shifting center of gravity and compounded joint discomfort from scoliosis and pregnancy (Heinz, 2008).

Evidence suggests that vital lung capacity is approximately 1.25 litres. Below this level problems may occur with deficient oxygenation of the blood (hypoxaemia), which is harmful to the growing baby and the mother (Simonds, 1998). Some women may require ventilatory support. Obstetric patients with scoliosis and severe Ehlers-Danols Syndrome are considered high risk related to uterine hemorrhages/rupture, miscarriage, and premature deliveries due to cervical incompetence (Heinz, 2008).

At the time of delivery, depending on the area of spine affected and the degree of spinal deformity, regional anesthesia, such as an epidural, may not be a possibility. Although in the past, cesarean sections were the norm in scoliosis, several case reports and support groups affirm uncomplicated vaginal deliveries without marked thoracolumbar distortion(Simonds, 1998).

There is little information in the literature on the impact of scoliosis on male or female fertility. Scoliosis can affect quality of life, causing problems with self-image, confidence, and back pain in severe cases of deformity. A case control study conducted over 20 years found no correlation between curve progression and age at first pregnancy. Pain was a minor reason for limitation, and some experienced a slight negative effect in their sexual life. Functional sexual discomfort requires education on pain-lessening sexual positions and empathic support/counseling to ease embarrassment during unclothed intimacy. This is all in the effort to decrease the anxiety and stress impact on hypothalamic secretion of GnRH. A rare but reported association exists between congenital scoliosis and mullerian duct deformities, namely isolated agenesis of the uterine cervix (Heinz, 2008).

Surgery

An article viewed on AC Associated Content – Health and Wellness website promoted the option of surgery as not only a necessary procedure for women with scoliosis wishing to have their own children, but suggests without the surgery scoliosis; “... often leave(s) them unable to have children by traditional pregnancy and delivery.” (Cadena, C, 2007)

The article goes on to promote the procedure by stating:

“... once that decision is made, and surgery is complete, the immediate results, including a profound change in hip alignment, often leave many women feeling a renewed sense of bodily self image in the hours after surgery.” (Cadena, C, 2007)

The information given in this article promotes a biased approach with no scientific evidence to support the claims made. The information and advice given could be misleading for the general public.

Treatment Plan

*N.B - The Practitioner must be continually mindful of what position is most comfortable for the client. Side lying with the support of pillows may need to be used instead of prone position.

My client visited the clinic 5 weeks after the birth, which meant the treatment plan was adjusted to my client's current state. The first treatment was very gentle due to client's pain levels; focus was on relaxation and reduction of stress. The second treatment was focused on reducing pain and adhesions, increasing range of motion, addressing postural problems and providing exercises for a home care program.

Client History

- Client experiencing cervical and upper thoracic pain that spreads across the shoulders. Thoracic pain due to structural scoliosis comes and goes– for last 15 years, diagnosed in adolescents.
- Client obtained a whiplash injury to the lumbosacral spine 4x days prior, while swimming in the surf, a wave crashed on lumbar spine, and has experienced pain in lumbar – sacrum region since.
- Client has been experiencing lumbar pain since pregnancy.
- Client complains of pain interfering with sleep, work/study, social activities, relationships, sport and recreation.
- Sleep patterns have been dramatically disrupted, due to new born baby.
- The client had a motor vehicle accident in 2006.

On return visit, client also mentioned the next two days after treatment were very painful, this may have been due to the release of stabilizing musculature and mobilization of the sacroiliac joint during the treatment. Client reports not having felt pain around sacroiliac joint since.

Palpation

The therapist palpates the erector spinae, quadratus lumborum, intercostals, trapezius and gluteus medius for hypertonicity and trigger points. Fibrosing in the concave side of the curve should be noted.

Active ROM

Cx

- Flex – Pain, tension
- Extension – Pain in neutral position, worsened with slight extension
- Lateral flex – Reduced ROM, both sides

Tx

- Lateral flex - decreased ROM towards the convexity.
- Rotation – reports a ‘catching’ when rotating left.

Lx

- Flex – Pain, reduced ROM
- Ext – Pain, reduced ROM
- Lateral flex – Pain, ‘pinching’ both sides

Passive ROM

Lx

- Ext – Pain around L4, L5, S1

Active Resisted ROM

- Weakness in the concave side of the curve and abdominals.
- Weakness in gluteus maximus, hypertonic Quadratus Lumborum, Lx Erector Spinae, gluteus medius

Orthopedic Testing

There is very little from the Magee text that suggests specific tests for scoliosis, either structural or functional. In many of the texts consulted during this research, it is evident that x-rays are heavily used to diagnose the condition.

Safety Tests:

- Valsalva's: -ve
- Straight leg raise: +ve, SIJ pain
- Slump: -ve
- Kemp's: -ve
- Spurlings: +ve, Left C3

McKenzie's Side Glide Test

If the patient has an evident scoliosis, the side to which the scoliosis curves should be tested first. A positive test is indicated by increased neurological symptoms on the affected side. It also indicates whether the symptoms are actually causing the scoliosis. (Magee, 2008).

Functional or Structural Scoliosis Test

Lateral bending is positive for functional scoliosis if the curve corrects or reverses as the client bends towards the convex side. If the curve does not correct and the lateral flexion is asymmetrical, the test is positive for structural scoliosis.

Forward Bending Test

If the curve or rib humping corrects or reverses, the test is positive for functional scoliosis. A lack of correction is positive for structural scoliosis.

Scoliosis Small Hemipelvis Test

To assess for a small hemipelvis that may contribute to a functional scoliosis.

An ischial lift is placed under the lower side correcting the lateral pelvic tilt. If the curve neutralizes, the test is positive for functional scoliosis, due to a small hemipelvis. If the lift is placed under the high side, the curve in a functional scoliosis will worsen.

Scoliosis Short Leg Test

To assess a short leg that contributes to a functional scoliosis.

Similarly to the small hemipelvis, a foot lift is placed under the apparently shorter leg, correcting the pelvic tilt. If the curve neutralizes, the test is positive for functional scoliosis. If the lift is placed under the longer limb, the scoliosis will worsen.

Rib Motion Test

To assess the motion of the ribs, and assess any asymmetry in rib movement.

Quadratus Lumborum Length Test

If restriction in the range of motion is noted on lateral flexion away from the side being assessed, the test is positive for QL shortness. (Rattray & Ludwig, 2000, pp.1087-1088, 1091, 1096).

Weber-Barstow Maneuver

To assess for leg length asymmetry.

Lx / Pelvic

- ASIS/PSIS: +ve Anterior tilted pelvis
- Gillet's: -ve
- Trendelenburg's: +ve
- Gapping: +ve
- Squish: -ve

DDX

Muscle spasm in Cervical and Shoulders causing facet joint sprain to left C3

Cervical Neural Impingement

Myofascial Trigger points and referral (levator scapula)

Whiplash injury to Sacrum and Lumbar Spine; Sprain in SIJ ligaments

Rx (2nd visit)

- Rocking – To help relax the client and give gentle mobilization to the spine
- Myofascial Release – Indirect: Fascial lines of the back, neck and shoulders
Direct: Paraspinal muscles on the concave side of Scoliosis
- Hydrotherapy – apply heat to tight, restricted muscles
- Neuromuscular Techniques, Trigger Point Release:

Prone

Cx and Shoulders

- Upper Traps, Supraspinatus, Infraspinatus, Rhomboids, Paraspinals, Levator Scapula

Tx and Lx

- Erector Spinae, Quadratus Lumborum, Gluts, Piriformis

Supine

Cx

- Sternocleidomastoid, Scalines, Cervical extensor group, Suboccipitals, Pectoralis major and minor, Subscapularis

Lx

- Psoas major, Iliacus
- Positional Release Techniques – Psoas
- Muscle Energy Techniques - Upper Trap, Levator Scapula
- Mobilization – First Rib, Scapula, Sacroiliac joint

***N.B** – No lengthening techniques are used on the convex side of scoliosis (side of rib humping) as these muscles are already in a lengthened/stretched position. Cross fiber frictions maybe used to break up adhesions.

Home Care Program

- ❖ Stretches given: Upper Traps, Levator Scapula, Pectoralis major, Gluteus maximus and medius, Piriformis.
- ❖ Hydrotherapy; Apply heat packs, (or with home care program - sitting in a warm/hot bath)
- ❖ Abdominal support straps that help support the pregnant uterus. These may help the client move more freely.
- ❖ Swimming is one of the best was to maintain cardiovascular endurance and the water also helps support the pregnant uterus and deload major weight bearing joints.
- ❖ Strengthening exercises; Pelvic-tilt exercises help stabilize the lower back and strengthen core stability, which will help to relieve pain. Also maintaining Pelvic floor strength.
- ❖ Non- weight bearing positions; lying supine and bringing knees to chest to get the baby out of the pelvis and proximal to pelvic nerves may relieve painful symptoms.

(Colliton, 2007)

Musculoskeletal Therapist's Role

The Musculoskeletal therapist can provide assist the expectant client throughout the term of pregnancy and also postnatal in recovering and rehabilitation. The therapist's treatment can aid in relief from pain and stress, promoting relaxation, and maintaining;

- Mobility,
- Circulation,
- Lymphatic flow

The Musculoskeletal therapist also provides advice and education in correct postural positions (including; standing, sitting, walking, sleeping), lifting and carrying. In addition to a home care program involving stretches (for; back, neck, hips) and strengthening exercises (for; abdominals, core stabilization, pelvic floor).

As a natural health practitioner, referrals may also be made if necessary (ie: Naturopath, Acupuncturist or Counselor).

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